

***SCALIBREGMA CELTICUM* NEW SPECIES
(POLYCHAETA: SCALIBREGMATIDAE) FROM
EUROPE, WITH A REDESCRIPTION OF
SCALIBREGMA INFLATUM RATHKE, 1843
AND COMMENTS ON THE GENUS
SCLEROBREGMA HARTMAN, 1965**

Andrew S. Y. Mackie

ABSTRACT

Scalibregma celticum new species is described from Europe and compared to *S. inflatum* Rathke, 1843, the type species of the genus. The new species differs from *S. inflatum* in the possession of eyes, form of the peristomium, structure of the mouth and tessellate pattern of the anterior dorsum. As both species possess short spines in the parapodia of some anterior setigers, the status of the genus *Sclerobregma* Hartman, 1965 is re-examined. *Sclerobregma* is retained for the type species, *S. branchiatum* Hartman, 1965, but *S. stenocerum* Bertelsen and Weston, 1980 is newly transferred to *Scalibregma*.

Scalibregma inflatum Rathke, 1843 (Type locality: Molde, Norway) is currently considered to be the most widespread scalibregmatid. Most other species of *Scalibregma* have been regarded as synonyms of *S. inflatum* (Furreg 1925; Støp-Bowitz 1945; Hartman 1959) and this is the only species cited in the revisions of Kudenov and Blake (1978) and Blake (1981). These later workers have, however, questioned the apparent cosmopolitan nature of the species.

Examination of material from European waters suggests there may be as many as four species of *Scalibregma* present. Two of these species (*S. inflatum* and *S. celticum* new species) are well represented in available collections and are described herein. The remaining species must await supplementary material before their true status can be determined.

MATERIALS AND METHODS

Material was obtained from the collections of the National Museum of Wales, Cardiff (NMW), the National Museum of Scotland, Edinburgh (NMS), the Zoological Museum, Oslo (ZMO) and the Norwegian Institute of Water Research, Grimstad (NIVA). Additional comparative material was borrowed from the Smithsonian Institution, National Museum of Natural History, Washington, D.C. (USNM) and the Natural History Museum of Los Angeles County (Allan Hancock Foundation Polychaete Collection), Los Angeles (NHMLAC/AHF). Specimens of both described species are deposited in the museums mentioned above and in the Swedish Museum of Natural History, Stockholm (SMNH) and the Australian Museum, Sydney (AM).

All drawings were prepared with the aid of a camera lucida.

SYSTEMATICS

Scalibregma inflatum Rathke, 1843
Figures 1–10

Scalibregma inflatum Rathke, 1843: 184–186, pl. 9, figs. 15–21.—Ashworth, 1901: 237–305, pls. 13–15.—Fauvel, 1927: 123–124, fig. 44 (in part).—Støp-Bowitz, 1945: 67–72, fig. 2.—Hartmann-Schröder, 1971: 382 (in part).

Oligobranchus roseus Sars, 1846: 91–94, pl. 10, figs. 20–27.

Material Examined.—NORWAY: near Sunndalsøra, Sunndalsfjord, mud, 94 m, 28 specimens (NIVA collections), 1 specimen (NMW.Z.1989.109.1); Fløre, 1 specimen (holotype of *Oligobranchus roseus*

?, ZMO D1222); Rosslandspollen, Herdla, sandy mud, 20 m, 1 specimen (ZMO C883); Herdlaosen, Herdla, sandy mud, 100 m, 2 specimens (ZMO C884); Lenefjord, near Lindnesnes, mud, 20–24 m, 3 specimens (ZMO C1223); Bolaerne, near Tønsberg, 15–18 m, 6 specimens (ZMO C1221); Indre Hallangspollen, Oslofjord, 10 m, 6 specimens (ZMO C844); Leangen, Oslofjord, mud, 15 m, 4 specimens (ZMO C846); Sandspollen, Oslofjord, 1 specimen (ZMO C851); Degeruddypet, Oslofjord, mud, 130 m, 1 specimen (ZMO C895); Ytre Halangspollen, Oslofjord, mud, 30 m, 1 specimen (ZMO C898).—SWEDEN: north of Saltö, Kosterfjord, mud, 15 m, 3 specimens (NMW.Z.1986.108.1); off Ytre Vattenholmen, Kosterfjord, muddy sand with gravel, 40–80 m, 1 specimen (NMW.Z.1986.108.2); southwest of Ytre Vattenholmen, Kosterfjord, sandy mud and gravel with stones, 40–65 m, 9 specimens (NMW.Z.1986.108.3); north of Lång Sound, Kosterfjord, sandy mud with detritus and algae, 10–15 m, 4 specimens (NMW.Z.1986.108.4).—SCOTLAND: Sullom Voe, Shetland, very fine sand, 14 m, 1 specimen (NMW.Z.1986.112.62); Loch Sunart, Argyll, sandy shell with silt, 8 m, 4 specimens (NMW.Z.1986.126.1); Loch Creran (upper basin), Argyll, mud, 25 m, 28 specimens (NMW.Z.1985.023.40–42), mud to muddy sand, 15–23 m, 252 specimens (NMW.Z.1985.091.1–11), 4 specimens (NMS.Z.1989.52), 6 specimens (ZMO C3247), 6 specimens (SMNH U. Polychaeta 5066), 6 specimens (USNM 123352), 6 specimens (AHF colls.), 6 specimens (AM W203785); Loch Sween, Argyll, 13 m, 1 specimen (NMS.Z.1989.54); Burntisland Harbour, Fife, 1 specimen (NMS.Z.1989.53).—WALES: Milford Haven, Dyfed, muddy sand to muddy sand with shell and gravel, 6–19 m, 14 specimens (NMW.Z.1985.087.1–5); north of Stack Rock, Milford Haven, Dyfed, mud with maërl, 11 m, 2 specimens (NMW.Z.1987.055.1); The Mumbles, Swansea Bay, West Glamorgan, silty sand, low tide level, 3 specimens (NMW.Z.1987.138.7).—IRELAND: Killary Harbour, Galway, mud to sandy mud, 15–25 m, 37 specimens (NMW.Z.1988.069.17–18).

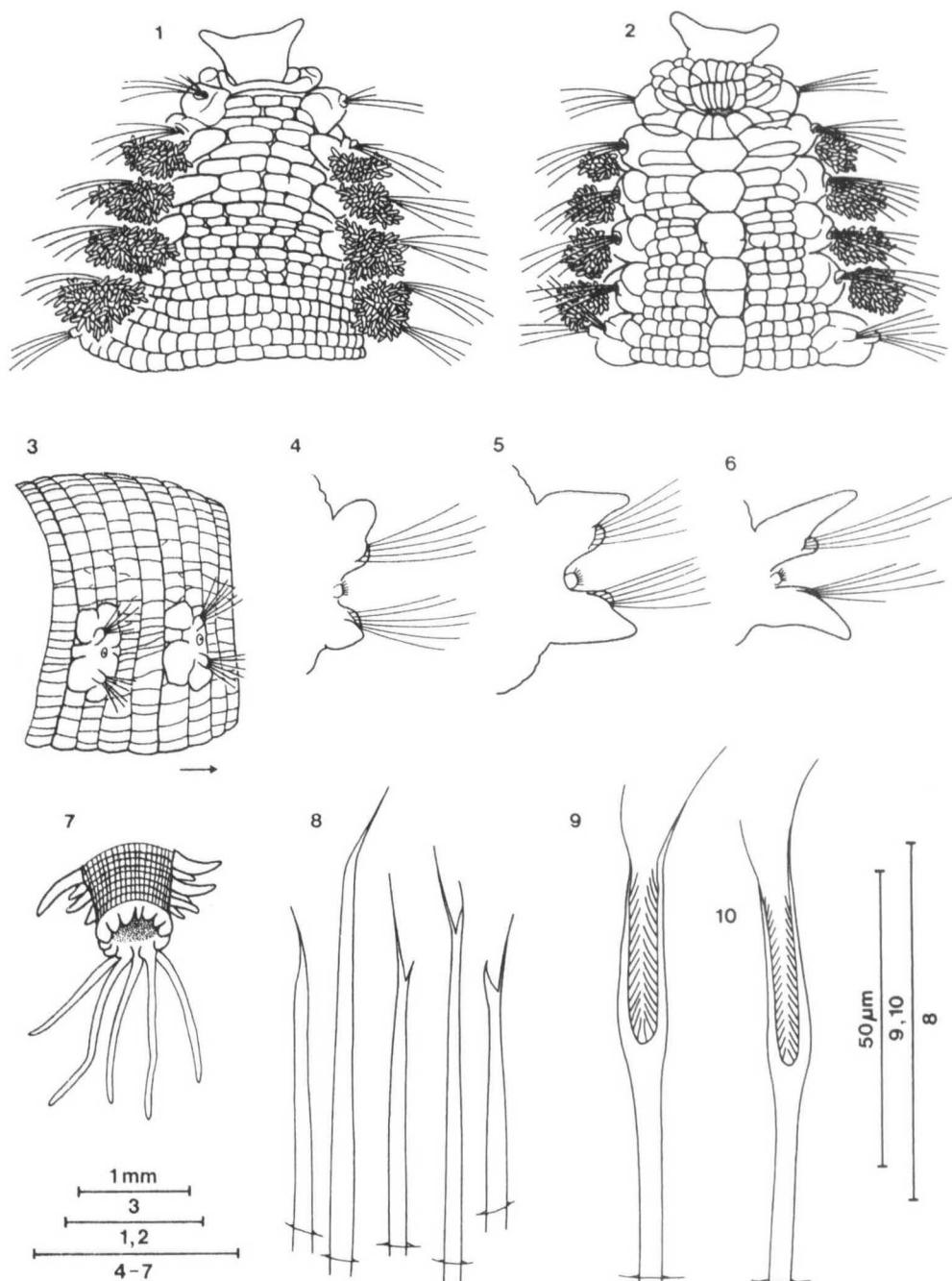
Description.—Length of entire specimens 1.25–37.0 mm for 23–64 segments. Figured specimen (NMW.Z.1985.091.1) 25 mm for 58 segments. Body arenicoliform, anterior half expanded to variable degree, posterior region tapered.

Prostomium T-shaped, lateral processes projecting laterally or anterolaterally, eyes lacking (Fig. 1). Peristomium asetigerous with pair of inconspicuous, but eversible, nuchal organs dorsolaterally on either side of prostomium. Peristomium narrow dorsally and laterally, but broad ventrally. Mouth ventral, represented by short transverse slit at junction between peristomium and setiger 1 (Fig. 2); upper lip a large biannulate and tessellate pad; lower lip narrower, formed by ventral region of setiger 1. Proboscis a large smooth eversible sac.

Setigers 1–3 triannulate, remainder quadriannulate or pentannulate (where anteriormost annulation of some posterior setigers exhibit secondary annulation). Body surface tessellate, each segmental annulation with single series of raised rectangular or square pads. Epidermal pads above notopodia of setigers 1–5 particularly large, epaulette-like, often somewhat trapezoidal. Other noticeably large epidermal pads posterior to parapodia of postbranchial setigers (Fig. 3). Venter with distinct mid-ventral row of large epidermal pads; pentagonal or hexagonal on setigers 2–3 or 4 (may be biannulate after setiger 2), rectangular and biannulate thereafter.

Branchiae arborescent, arising posterior to notopodia on setigers 2–5 throughout size range investigated. Parapodia on anterior third of body small and inconspicuous, with low presetal lobes. Dorsal and ventral cirri evident from setiger 14–16 and 15–17 respectively; initially small and rounded (Fig. 4), thereafter increasing in size becoming triangular (Fig. 5), then lanceolate (Fig. 6). In posteriormost region several (4–9) segments lacking distinct parapodia (and setae), possessing only cirri; some (1–3) immediately preanal segments lacking all such features. Interramal sense organs from setiger 1 as single small ciliated papillae. Pygidium with crenulate margin around anal aperture and five (1 median ventral, 2 pairs ventrolateral) filiform anal cirri (Fig. 7).

All setigers with slender hirsute capillaries in both rami. Young specimens with slender pointed spines located in single short rows (inferior halves of notosetal bundles, superior halves of neurosetal bundles) anterior to capillaries of setiger 1. Spines short, smooth, often bifurcate (Fig. 8) in adult specimens. Fully devel-



Figures 1–10. *Scalibregma inflatum* (1–7, NMW.Z.1985.091.1; 8–10, NMW.Z.1985.091.2): 1, Anterior region, dorsal view; 2, Same, ventral view; 3, Setigers 8 and 9, lateral view (arrow points towards anterior); 4–6, Parapodia of setigers 17, 23 and 36, posterior views; 7, Posterior region, oblique dorsal view; 8, Slender spines from setiger 1; 9 and 10, Furcate setae from setigers 2 and 15.

oped furcate setae, in identical positions to spines of setiger 1, from setiger 2; tines unequal (tine ratio about 1.2), with spinose inner margins (Figs. 9, 10). Spines and furcate setae readily visible at magnifications greater than $\times 200$, but in some cases may be obscured by presetal lobes.

Color.—Living animals red to yellow-orange. Alcohol preserved specimens grey-yellow to orange. Use of the stain Rose Bengal reveals brightly staining glandular inclusions in the dorsal and ventral cirri. Additional small solitary glandular patches also often evident above and below the parapodia of setigers 4 and 5.

Reproduction.—During studies at a mud station (25 m) in Loch Creran in 1978 eggs were found in the coelom from August to March. The eggs were discoid with a maximum diameter of 150 μm (January to March). Juveniles appeared in 0.5 mm sieved samples from April, reaching a maximum of 3,720 m^{-2} in August. At this locality *S. inflatum* appears to have a maximum lifespan of about 2 years, though animals can become reproductive in their first year.

Remarks.—Type material of *S. inflatum* is not known to exist (Støp-Bowitz, pers. comm.). The specimen from Florø (ZMO D1222) was collected by Sars and may well be the holotype of *Oligobranchus roseus* Sars, 1846, a species long considered to be a synonym of *S. inflatum* (see Sars, 1863: 304). The specimen is fragmented and poorly preserved, but conforms well with the present description and with specimens from Sunndalsfjord (near Molde, the type locality of *S. inflatum*). Rathke's description is generally good, though two anterior abranchiate setigers were figured. This appears to be simply an artist's error since the "first setiger" is clearly the peristomium. Consequently, there are no grounds to doubt the synonymy of *O. roseus* with *S. inflatum*.

No attempt has been made to produce a comprehensive synonymy list for *S. inflatum* as most of the widespread records provide insufficient detail for confident re-appraisals. The major descriptions of material from the Northeast Atlantic (Ashworth, 1901; Fauvel, 1927; Støp-Bowitz, 1945) primarily relate to the species described above. Nevertheless, several descriptions (Ashworth, 1915; Fage and Legendre, 1927; Fauvel, 1927; Hartmann-Schröder, 1971) also concern or incorporate the new species described below.

Scalibregma celticum new species Figures 11–22

Scalibregma.—Ashworth, 1915: 409 (in part).

Scalibregma inflatum.—Fage and Legendre, 1927: 176–183, fig. 29.—Fauvel, 1927: 123–124, fig. 44 (in part).—Hartmann-Schröder, 1971: 382 (in part).

Material Examined.—SCOTLAND: Loch Creran (upper basin), Argyll, sandy mud to muddy sand, 20–21 m, 10 specimens (NMW.Z.1985.091.12–14).—WALES: Llanddwyn Bay, Anglesey, silty sand, shore, 1 specimen (NMW.Z.1985.038.7); Milford Haven, Dyfed, muddy sand to muddy sand with shell and gravel, 6–19 m, holotype (NMW.Z.1985.087.6), 85 paratypes (NMW.Z.1985.087.7–14), 8 paratypes (NMS.Z.1989.50–51), 6 paratypes (ZMO C3248), 6 paratypes (SMNH Type Coll. 4108–4109), 8 paratypes (USNM 123353–123354), 6 paratypes (AHF POLY 1500), 6 paratypes (AM W203786); north of Stack Rock, Milford Haven, Dyfed, mud with maërl, 11–12 m, 7 specimens (NMW.Z.1987.055.2–3).—FRANCE: south of Punta d'en Camas, near Banyuls-sur-Mer, Pyrenees-Orientales, sand with *Zostera* among boulders, 11 m, 1 specimen (NMW.Z.1987.084.3).

Description.—Length of entire specimens 2.5–22.0 mm for 30–48 segments. Holotype 18 mm for 48 segments. Body arenicoliform, anterior half expanded to variable degree, posterior region tapered.

Prostomium T-shaped, lateral processes projecting laterally or anterolaterally (Fig. 11). Single pair of dark brown to black subdermal eyes on posterolateral

margins of prostomium (Fig. 12); each eye composed of two semicircular plates arranged in V-shaped configuration (Fig. 13). Peristomium dorsally expanded, hood-like, generally covering eyes and posterior prostomium. Peristomium aseptigerous with pair of inconspicuous, but eversible, nuchal organs laterally on either side of prostomium immediately behind eyes. Mouth ventral, represented by short transverse slit at junction between peristomium and setiger 1 (Fig. 14); upper lip with distinct longitudinal median fold; lower lip large, with radiating wrinkles, formed by ventral region of setiger 1. Proboscis a large smooth eversible sac.

Setiger 1 triannulate, remainder quadriannulate or pentannulate (some posterior setigers). Body surface tessellate, each segmental annulation with single series of raised rectangular or square pads. Epidermal pads above notopodia of setigers 1–5 only slightly larger than adjacent ones on dorsum. Epidermal pads conspicuously larger anterior to parapodia of setigers 2–5, but only slightly larger posterior to parapodia of postbranchial setigers (Fig. 15). Venter with distinct mid-ventral row of large epidermal pads; broad rectangular to trapezoidal and biannulate on setiger 2, rectangular and biannulate thereafter.

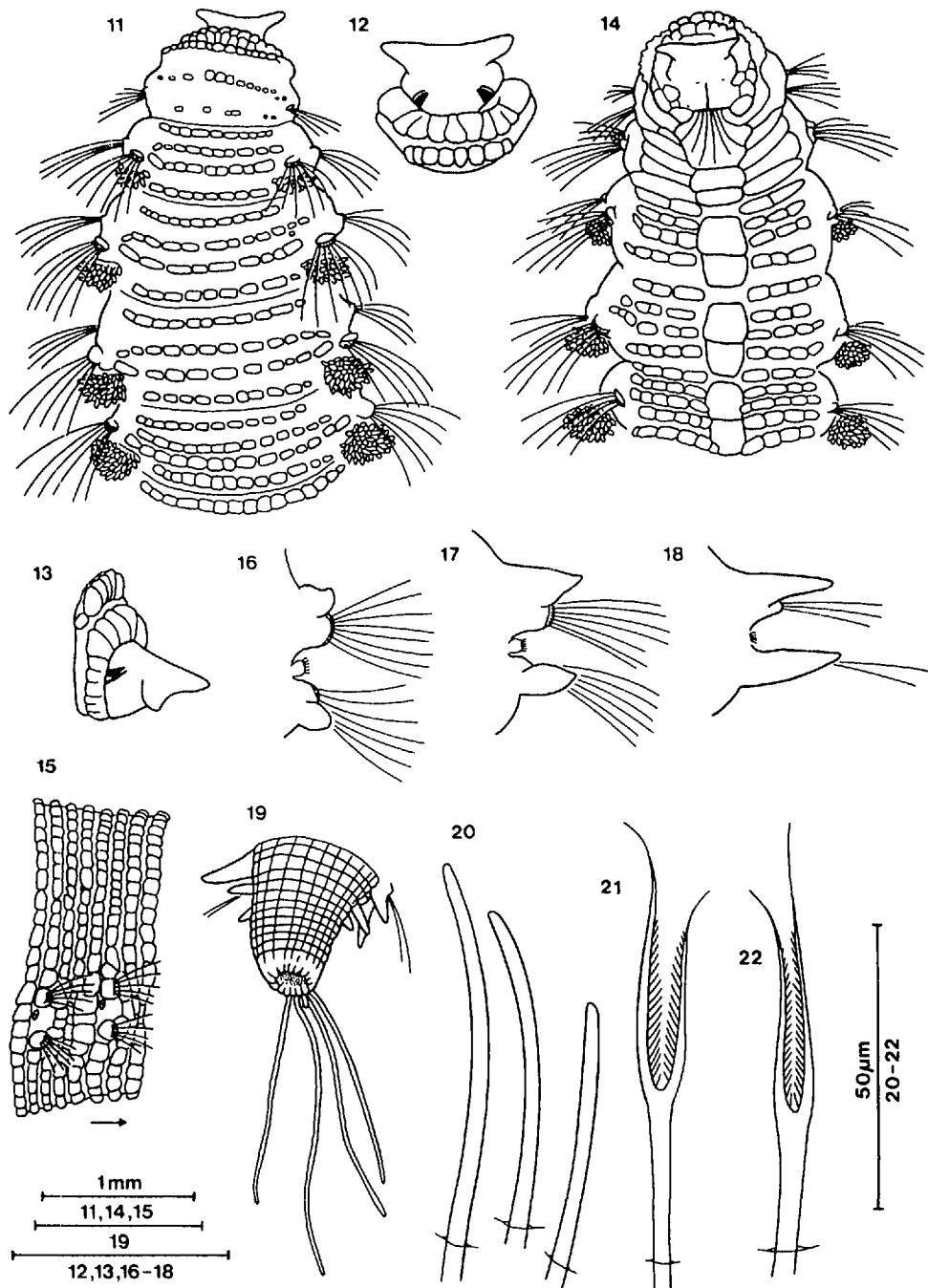
Branchiae arborescent, arising posterior to notopodia on setigers 2–5; first pair much smaller than following pairs (branchiae completely lacking on setiger 2 of smallest specimen examined, but specimen 3.2 mm long for 35 segments with all four pairs evident). Parapodia on anterior third of body small and inconspicuous, with low presetal lobes. Dorsal and ventral cirri present from setiger 15 or 16; initially small and rounded (Fig. 16), thereafter increasing in size becoming triangular (Fig. 17), then lanceolate (Fig. 18). In posteriormost region several (2 or 3) segments lacking distinct parapodia (and setae), possessing only cirri; some (1–3) immediately pre-anal segments lacking all such features. Interramal sense organs from setiger 1 as single small ciliated papillae. Pygidium with crenulate margin around anal aperture and five long, ventrally inserted, filiform anal cirri (Fig. 19).

All setigers with slender hirsute capillaries in both rami. All specimens with slender spines located in single short rows (inferior halves of notosetal bundles, superior halves of neurosetal bundles) anterior to capillaries of setigers 1 and 2. Spines short, blunt and smooth (Fig. 20). Furcate setae, in identical positions to spines of preceding setigers, from setiger 3; tines unequal (tine ratio about 1.3), with spinose inner margins (Figs. 21, 22). Spines and furcate setae readily visible at magnifications greater than $\times 200$, but in some cases may be obscured by presetal lobes.

Color.—Alcohol preserved specimens white-yellow to yellow-pink. Use of the stain Rose Bengal reveals brightly staining glandular inclusions in the dorsal and ventral cirri. Solitary strongly staining patches occur ventral to the parapodia of setigers 4–6 and dorsal to the parapodia of setigers 4 and 5. In addition, the epidermal pads of setigers 2–7 (particularly those on the dorsum) are generally brightly stained. Further bright staining sometimes evident as minute flecks in the small epidermal pads of posterior setigers.

Reproduction.—Some of the larger specimens from Milford Haven (collected in July 1987 or August 1985) were ovigerous. The eggs were discoid with a maximum diameter in August of 80 μm . The specimen from Banyuls was collected in October 1987 and had eggs up to 100 μm diameter. The two smallest juveniles were obtained from Loch Creran in September 1985.

Etymology.—The specific name (*celticum*, L.—celtic) relates to the distribution of the species in Wales, Scotland and France.



Figures 11–22. *Scalibregma celticum* sp. nov. (11, 14–19 and 22, holotype, NMW.Z.1985.087.6; 12 and 13, paratype, NMW.Z.1985.087.8; 20 and 21, NMW.Z.1987.055.2): 11, Anterior region, dorsal view; 12, Prostomium and peristomium, dorsal view; 13, Same, anterolateral view; 14, Anterior region, ventral view; 15, Setigers 8 and 9, lateral view (arrow points towards anterior); 16–18, Parapodia of setigers 17, 31 and 39, posterior views; 19, Posterior region, oblique dorsal view (median anal cirrus broken); 20, Slender spines from setiger 2; 21 and 22, Furcate setae from setigers 3 and 17.

Remarks.—The new species has previously been recorded (as *S. inflatum*) from the English Channel (Plymouth, England and Cherbourg, France) by Ashworth (1915) and from Concarneau, southwest Brittany, France by Fage and Legendre (1927). The latter authors discussed the presence of eyes and small size of their sexually mature specimens, but considered their material to simply represent a southern variety of *Scalibregma inflatum*. However, the morphological consistency observed in the present study, from juvenile to ovigerous adult, clearly supports the erection of a new species.

S. celticum can be distinguished from *S. inflatum* by the presence of the following features: eyes; short blunt spines in parapodia of both setigers 1 and 2; expanded hood-like peristomium obscuring eyes and posterior part of prostomium; medially folded upper lip of mouth; smaller epidermal pads above notopodia and across dorsum of setigers 1–5; strong staining of anterior dorsum when Rose Bengal is used; very long slender anal cirri. Further, *S. celticum* would seem to be a smaller species and has a maximum of 48 segments against the 64 recorded for *S. inflatum*.

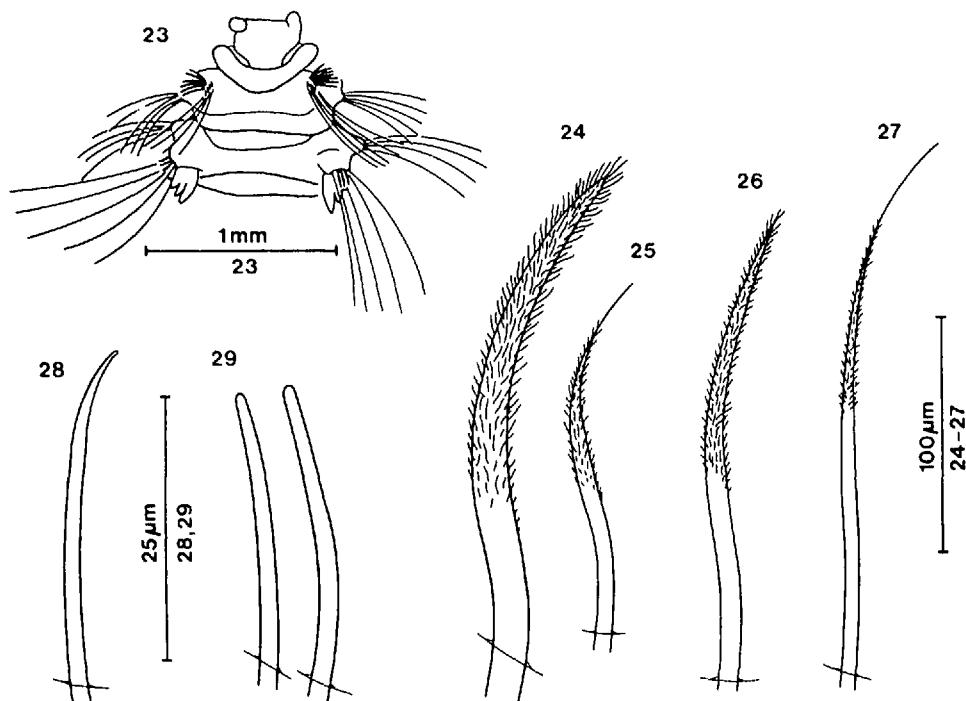
S. celticum appears very similar to *Sclerobregma stenocerum* Bertelsen and Weston, 1980 from the southeastern United States (17–218 m) and Gulf of Mexico (Kudenov, 1984). Both species have eyes, an expanded peristomium obscuring the eyes and posterior prostomium, and short blunt spines in several anterior parapodia. *S. celticum* differs in having (rather than lacking) branchiae on setiger 2 and short (rather than long) prostomial processes.

DISCUSSION

The genus *Sclerobregma* was erected by Hartman (1965) for a new scalibregmatid, *S. branchiatum*, from deep water (400–2,500 m) off New England, USA. The genus was separated from *Scalibregma* by the presence of acicular spines in the anterior setigers. Bertelsen and Weston (1980) described a second species of *Sclerobregma* (*S. stenocerum*) that differed from *S. branchiatum* in a number of respects, including the presence of very short smooth blunt (rather than long hirsute pointed) spines in the parapodia of setigers 1 and 2 or 1–3. As *Scalibregma inflatum*, the type species of *Scalibregma*, has been found (this paper) to possess very short smooth pointed spines in the parapodia of setiger 1, the status of *Sclerobregma* must now be re-examined.

Type material of both species of *Sclerobregma* (*S. branchiatum*, holotype, AHF POLY 0484; *S. stenocerum*, holotype, USNM 58955, and paratype, USNM 58956) was examined. Additional material of *S. branchiatum* from station G1 (type locality; 43 specimens) and station A73 (Hartman and Fauchald, 1971; 37 specimens) was obtained from the AHF collections.

Examination of *S. branchiatum* confirmed the corrections to the original description as detailed by Bertelsen and Weston (1980: 713). Large hirsute acicular spines were, however, only evident in the notopodia of setigers 1 and 2 (Fig. 23). The notopodial spines of setiger 1 were arranged in 2 rows anterior to the capillary setae; those of the first row were large, robust and bluntly pointed (Fig. 24), often anteriorly directed; those of the second row were shorter, more slender and sharply tapered (Fig. 25), and arose just anterior to the capillary setae. The notopodial spines of setiger 2 were more slender than the larger spines of setiger 1 (Fig. 26) and occurred as single rows just anterior to the capillary setae. The notopodia of setiger 3 and neuropodia of setigers 1–3 carried single rows of transitional setae (Fig. 27) in similar positions. No large neuropodial spines were observed. Single short rows of short slender smooth spines (Figs. 28, 29) preceded all other setal



Figures 23–29. *Sclerobregma branchiatum* (23, holotype, AHF POLY 0484; 24–29, specimen from stn. A73, AHF collections): 23, Anterior region, dorsal view; 24, Large notopodial spine from setiger 1 (first row); 25, Small notopodial spine from setiger 1 (second row); 26, Notopodial spine from setiger 2; 27, Transition notoseta from setiger 3; 28, Slender neuropodial spine from setiger 1; 29, Worn (?) slender notopodial spines from setiger 2.

types in both rami of setigers 1 and 2. Furcate setae were present, in identical positions to the short smooth spines, from setiger 3. The short slender smooth spines in the anterior parapodia of *S. stenocerum* were likewise inconspicuous (but visible at $\times 200$ magnification) and occupied similar locations anterior to the capillary setae, as did the furcate setae from setiger 3.

It is clear, therefore, that *Scalibregma inflatum*, *S. celticum*, *Sclerobregma branchiatum* and *S. stenocerum* all possess short slender smooth spines in both rami of some anterior parapodia. Further, these spines are located in the same positions in each setal bundle as the furcate setae of later setigers. Consideration of these observations, in conjunction with the tendency for the spines to bifurcate in larger specimens of *Scalibregma inflatum*, indicates that these setae are homologous with the furcate setae. In contrast, the positions, structure and gradations exhibited by the large notosetae from setigers 1 to 3 in *Sclerobregma branchiatum* suggest these are homologous with the capillary setae.

Sclerobregma stenocerum lacks the large hirsute acicular spines that are a diagnostic feature of the genus *Sclerobregma* and is consequently referred here to *Scalibregma*.

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ADDRESS: Department of Zoology, National Museum of Wales, Cathays Park, Cardiff CF1 3NP, Wales, United Kingdom.